



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor Patent Application of:

Saltiel

Serial No. 10/649,287

Filing Date: August 27, 2003

For: Photochemical Synthesis
Of Vitamin Ds

Examiner: Edna Wong

Art Unit: 1753

DECLARATION UNDER 37 CFR 1.132

Sir:

I hereby declare that:

1. I am the named inventor and Applicant in the above referenced patent application.
2. I hold the Ph.D. degree in Chemistry and am a member of the faculty in the Department of Chemistry, Florida State University, Tallahassee, Florida, a position I have held for many years.
3. Cis-trans photoisomerization has been my major area of research for over forty years and I am recognized by peers as one of the foremost experts in this field.
4. Sensitized cis-trans photoisomerization was the topic of my doctoral dissertation at CalTech in 1964 and a paper based on that research and published in JACS in 1964 is considered ground-breaking and has received over 700 citations.

5. In that capacity, it is my opinion that the claimed invention is fully supported in the application as filed, and as evidence thereof I submit the following comments and enclose the following document as Exhibit A.

6. First, at least a portion of the description provided in the present application originates from a scientific paper published by Applicant and others in the *Journal of the American Chemical Society* (JACS), 2003, 125, 2866-2867. That scientific publication not only describes the claimed invention and forms the body of the parent application to which the present application claims priority (US Provisional Application Serial No. 60/407,137 but is also incorporated by reference in the present application at page 21, line 29, through page 22, line 2. Applicant respectfully points out that JACS is a peer-reviewed journal which requires that any article to be published therein be first reviewed by peers having at least ordinary skill in the chemical arts to which the article pertains and be approved for publication by an editor of the journal who is also skilled in the chemical arts to which the article pertains. A copy of the published article is enclosed as Exhibit A for the Examiner's information.

7. The present application as filed, as well as the published article noted above, leave no doubt that the claimed invention does not require a photosensitizer. The two-step irradiation processes are the "two strategies" discussed beginning on page 20, line 16 of the present application. The skilled would know that "a triplet energy donor" (page 20, line 19) is a photosensitizer. Furthermore, the words "direct excitation" (page 20, line 21) indicate that these are processes without a photosensitizer. Thus, the two strategies discussed starting on page 20, line 16, differ in that one is with and the other is without a photosensitizer in the second step. For the Examiner's information, Applicant points out that a useful photosensitizer absorbs practically all the incident light, efficiently forms a triplet state and then transfers the triplet excitation to the reactant, which in the present invention is tachysterol. In the photosensitized reaction, it is the photosensitizer that absorbs the light energy. The reactant absorbs no light energy and, accordingly, it is not *directly* excited.

8. In the present invention, I excite the tachysterol directly in the second step as does Malatesta (see reference 55, page 8 of the application, and the patent cited by the Examiner) and Dauben (see reference 56, page 8 of the application). The difference between the Malatesta, et al. patent (this applies to Dauben also) and the present invention is that they employ excitation wavelengths in the 330-360 nm range where the light is barely absorbed by tachysterol (see the HOTachy curve in our Figure 8), whereas in the present invention I excite tachysterol at 313 nm or in the 300 to less than 330 nm range (our claims 1, 6, 11, 18 and 24), where the tachysterol spectrum absorbs light much more strongly (see the well-defined shoulder in that wavelength region in the HOTachy spectrum in Figure 8).

9. In addition, I ascribe that shoulder to a specific conformer (geometrical structure of tachysterol; see page 22, lines 25 and 26 of the present application) which has been shown in my laboratory to photoisomerize to previtamin D four times more efficiently than previously claimed (see page 23, line 14 of the present patent application). Unexpected advantages of exciting in the presently designated wavelength range (313 nm or 300 to less than 330 nm) are (i) the efficient absorption of the exciting light by tachysterol and (ii) the four-fold higher efficiency of tachysterol to previtamin conversion. This high efficiency of tachysterol to previtamin conversion was unknown prior to the present discovery and could not, therefore, have been made obvious by any previous disclosure. As for the absence of a photosensitizer, the 313 nm excitation is specifically associated with direct excitation within the 300 to less than 330 nm shoulder where I have disclosed that the cEc-Tachy conformer absorbs (see page 23, line 17 of the present patent application).

10. Thus, the application as filed specifically addresses the disadvantages of the Malatesta et al. and the Dauben and Phillips approaches starting on page 20, line 26, for example: "Unfortunately, the *second wavelengths* that have been suggested are barely absorbed by Tachy and in addition, the desired selective excitation advantage is almost

lost." (emphasis added; the second wavelengths being those used in the second direct excitation steps).

11. Accordingly, as noted above in paragraphs 5-7, the claims are fully supported in the application as filed with regard to the method of the invention not requiring a photosensitizer. Additionally, for the reasons stated in paragraphs 8-10 it is my opinion that the invention presently claimed is not made obvious by any of the cited references, either singly or in combination.

I hereby declare that all statements made herein are of my own knowledge are true and that all statements made on information and belief are true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

9-09-2006
Date

Jack Saltiel
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